Probability and Random Processes

ECS 315

Asst. Prof. Dr. Prapun Suksompong

(ผศ.ดร.ประพันธ์ สุขสมปอง)

prapun@siit.tu.ac.th

Introduction

Office Hours:

BKD, 6th floor of Sirindhralai building

Wednesday	**14:30-15:30**
Friday	**14:30-15:30**

Course Website

prapun.com

Asst. Prof. Dr.Prapun Su
Sirindhorn International
university. He topped th
2003 and got his Ph.D. i

Right after his graduatic
two other faculty memb
คณะ ประเภทอาจารย์) from Thammasa

Ajarn Prapun always highly values the
IEEE Student Branch "for exemplary t

For more information, here is his CV.

ECS315: Probability and Random Processes

Everything we do, everything that happens around us, obeys the laws of probability. We can no more escape them than we can escape gravity... "Probability," a philosopher (Bishop Butler) once said, "is the very guide of life." We are all gamblers who go through life making countless bets on the outcome of countless actions.

Every field of science is concerned with estimating probability. A physicist calculates the probable path of a particle. A geneticist calculates the chances that a couple will have blue-eyed children. Insurance companies, businessmen, stockbrokers, sociologists, politicians, military experts – all have to be skilled in calculating the probability of the events with which they are concerned.

[Gardner, 1986]

Synopsis

Probability theory is the branch of mathematics that tells us how to estimate degrees of probability. If an event is certain to happen, it is given a probability of 1. If it is certain not to happen, it has a probability of 0.

This course introduces the principles of probability and random processes to undergraduate students in electronics and communication. The topics to be covered include random experiments, events, probability, discrete and continuous random variables, probability density function, cumulative distribution function, functions of random variables, expectations, law of large numbers, central limit theorem, introduction to random processes, Gaussian random process, autocorrelation and power spectral density.

Announcements

- Note that we also share the tutorial/make-up session with ECS332. See Google calendar below.

Teaching

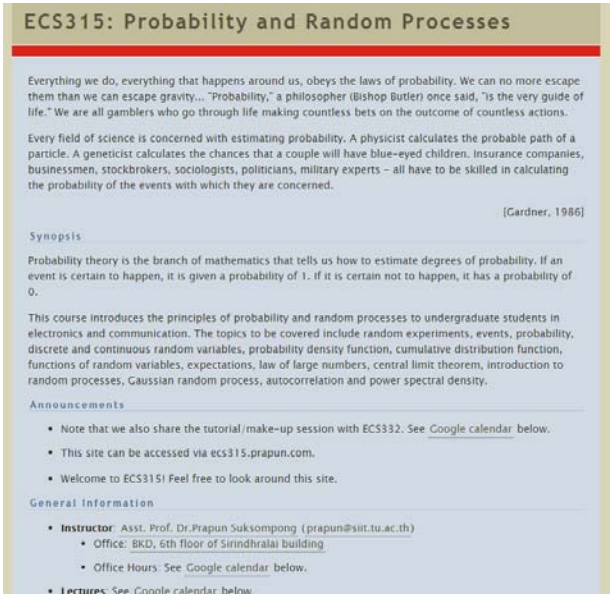
- For 1/2018, he teaches
  - ECS315 (Probability and Random Processes)
  - ECS332 (Principles of Communications)
- For 3/2017, he taught
  - ICT Elementary for Embedded Systems (Fourier transform and principles
- For 2/2017, he taught
  - ECS452 (Digital Communication Systems)
- For 1/2017, he taught
  - ECS315 (Probability and Random Processes)
  - ECS332 (Principles of Communications)

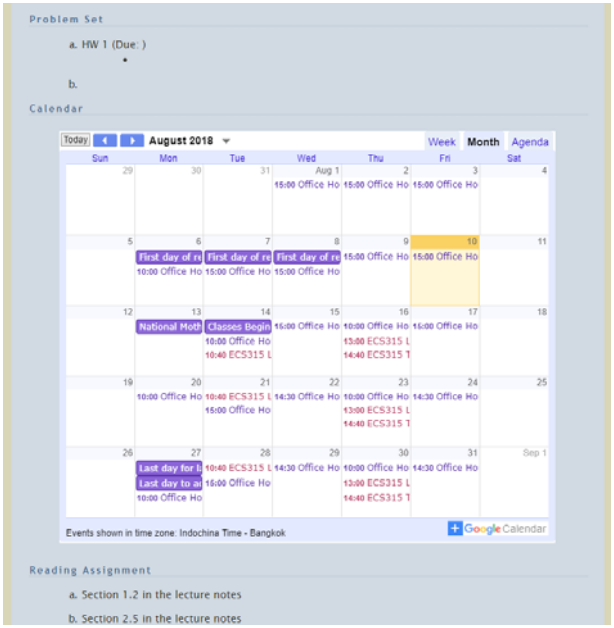
Current version

Earlier version

Course Web Site

- Announcements
- References
- Handouts (Posted before corresponding lectures; also available at the copy center)
- Annotated Notes/Slides (Posted after corresponding lectures)
- Calendar
  - Exams
  - HW due dates





Please check the course website regularly.

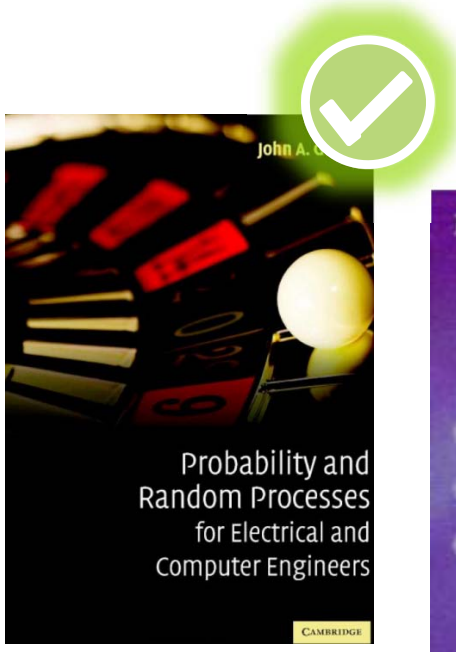
www2.siit.tu.ac.th/prapun/ecs315/

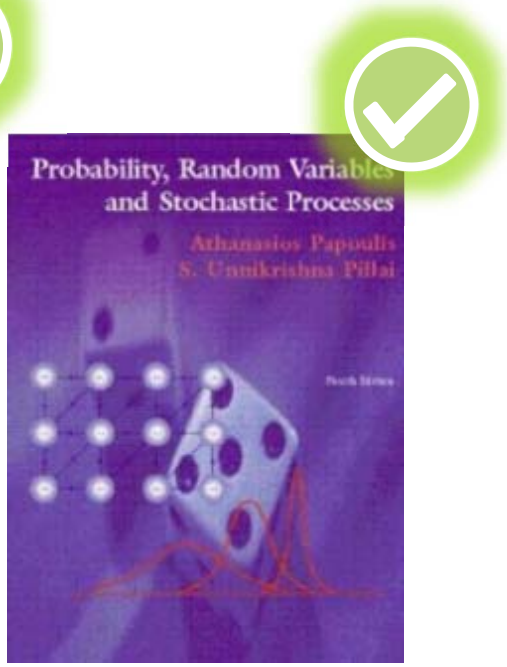
The Thursday Sessions

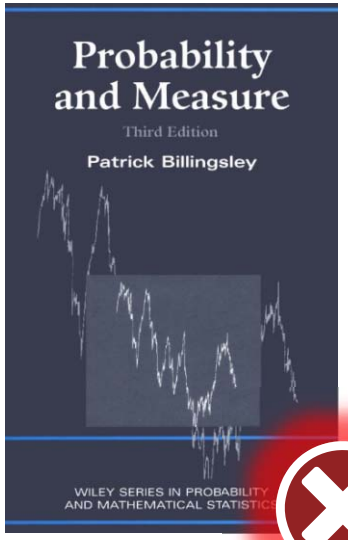
- Shared with ECS332.
- The first 4-5 sessions will be used for ECS315 **tutorial/review** classes.
- Later, we will start using them as tutorial sessions.
  - Will be conducted **in Thai** to help those who have problem with English.
    - Hopefully, you will ask more questions as well.
- They can also be used for pre-announced make-up classes and in-class exercises as well.

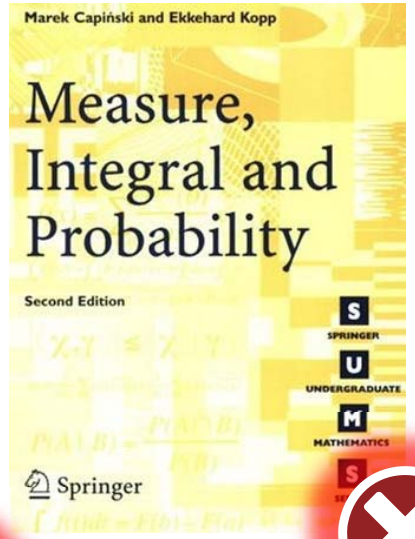
More references

- Use ones that say probability and random (or stochastic) processes
- If it has the word "statistics" in the title, it may not be rigorous enough for this class
  - Many chapters will overlap our class content. In which case, it provide a nice reading with beautiful/colorful figures.
- If it has the word "measure" or "ergodic" in there, it is probably too advanced.



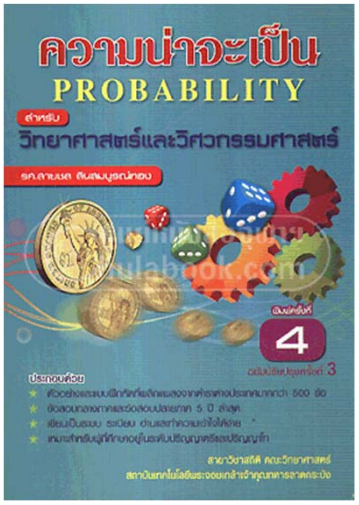


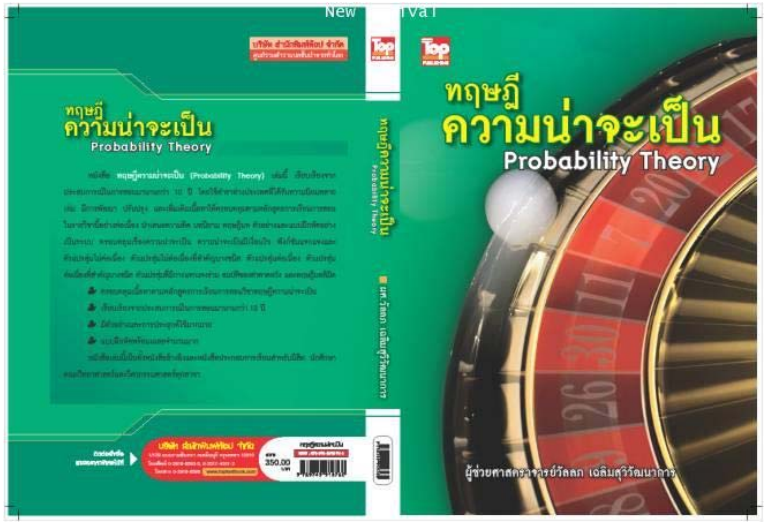




More References (in Thai)

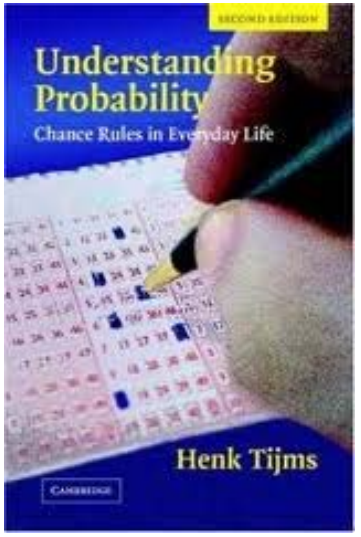
- ความน่าจะเป็นและสถิติสำหรับวิศวกรรมไฟฟ้า
  - ผู้แต่ง: มานพ วงศ์สายสุวรรณ และคณะ
  - ISBN : 9789740324164
- ความน่าจะเป็น :สำหรับวิทยาศาสตร์และวิศวกรรมศาสตร์ (PROBABILITY)
  - ผู้แต่ง : สายชล สินสมบูรณ์ทอง
  - ISBN : 9789740329053
- ทฤษฎีความน่าจะเป็น - Probability Theory
  - ผู้เขียน: ผู้ช่วยศาสตราจารย์วัลลภ เฉลิมสุวิวัฒนาการ
  - ISBN 9789749918760



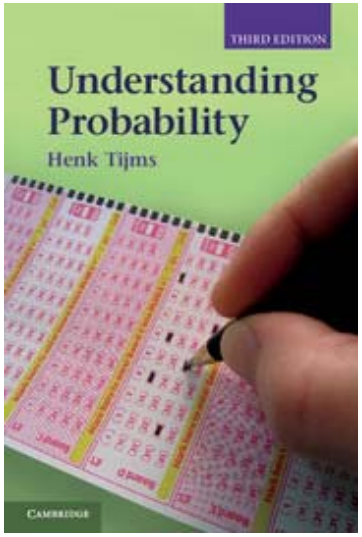


Recommended Reading

- Understanding Probability: Chance Rules in Everyday Life
- By Henk Tijms
- Call No. QA273 T48 2012
- Cambridge University Press
- "Part One" provides many motivating examples and problems from everyday life
- "Part Two" teaches clearly and simply the mathematics of probability theory.
- Sample materials are available at the author's website: http://personal.vu.nl/h.c.tijms/
- http://www.cambridge.org/aus/catalogue/catalogue.asp?isbn=9781107658561&ss=exc

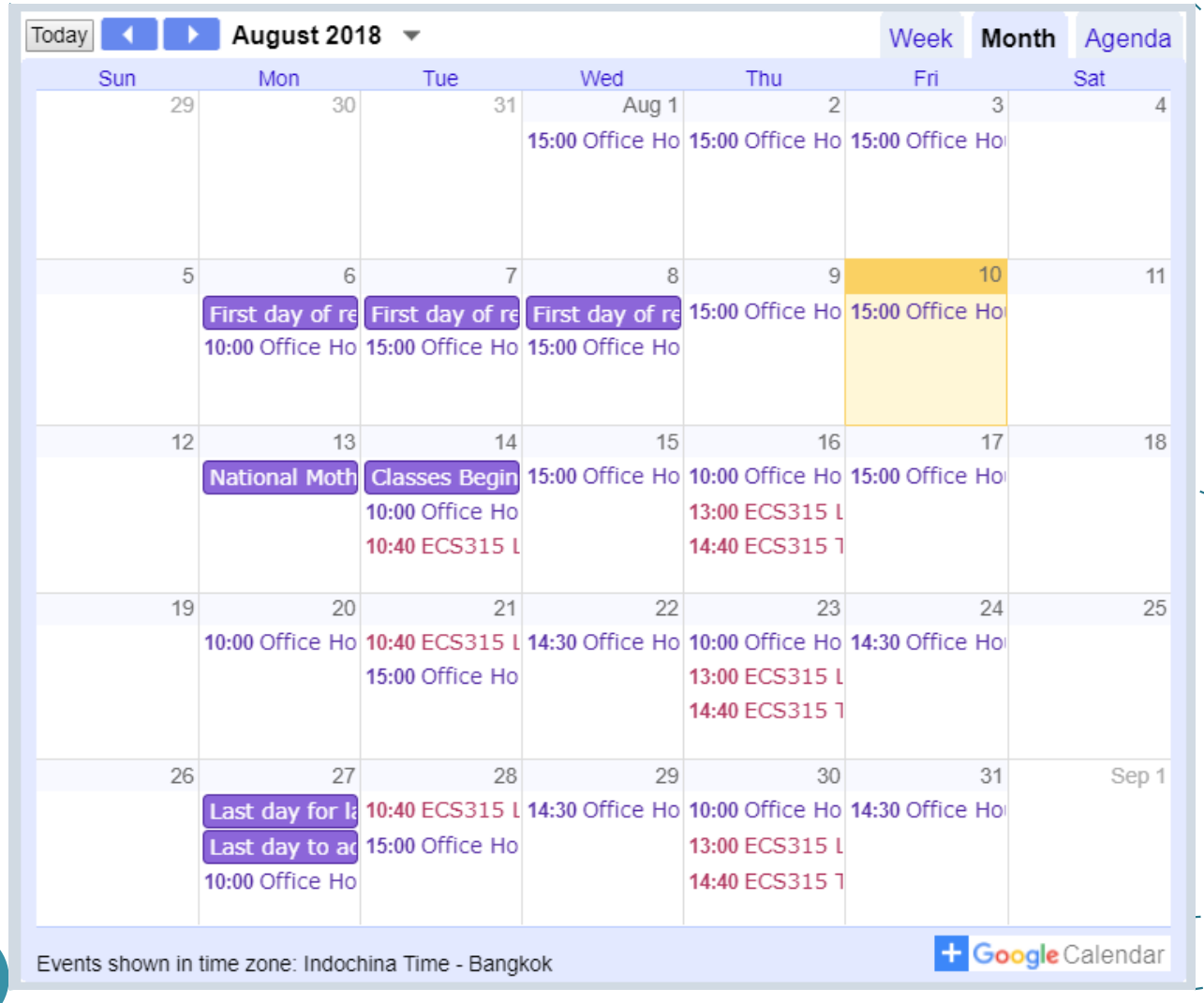


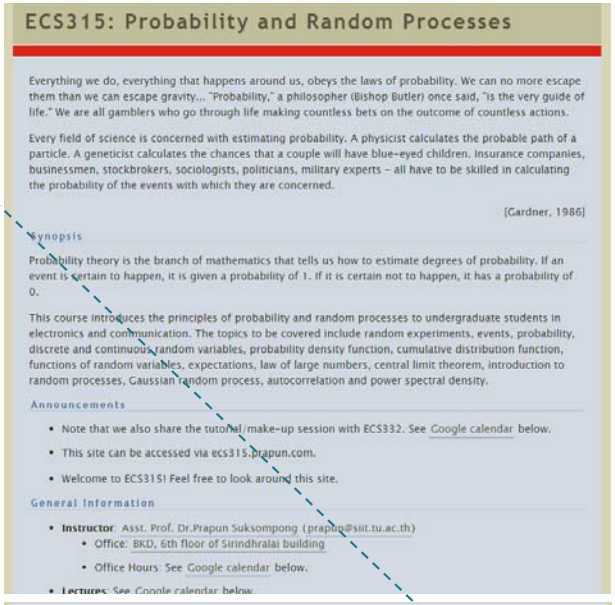
2nd Edition (2007)
3rd Edition (2012)

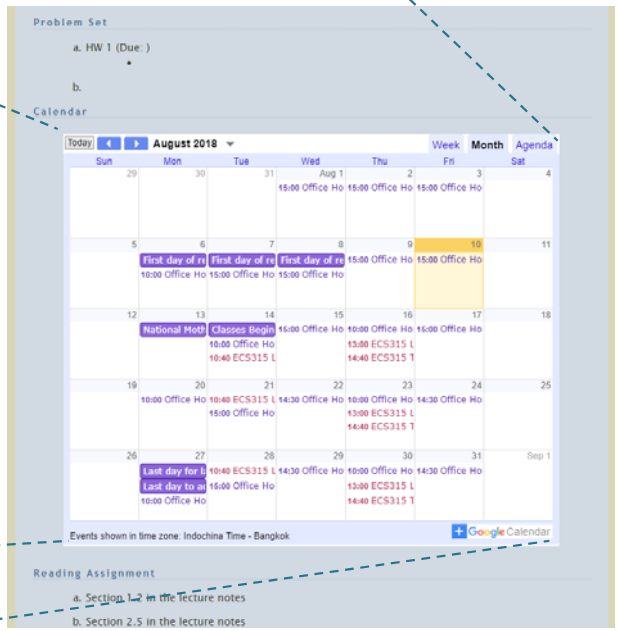


Calendar (Google)

Available on the course website.

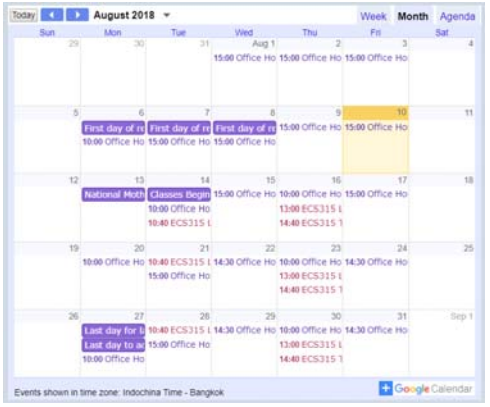






Help and Office Hours

- Get some help!
  - Do not wait until the final exam time or after the grade is out.
  - Right after lecture is always a good time to ask question.
- Office Hours
  - Tentative Time: W,F 14:30-15:30
  - Check Google Calendar on the course website.
  - Appointment can be made.
  - Feel free to come to my office and chat!
  - Don't be shy.



	Asst.Prof.Dr.Prapun Suksompong - 1/2018				
	9.00-10.20	10.40-12.00	13.00-14.20	14.40-16.00	16:00-17:00
MON	OH		JAE	MEETING	
TUE		ECS315 BKD 2506		OH	
WED		ECS332 BKD 3215		Office Hour	
THU	OH		ECS315 BKD 3214	ECS315/332 BKD 3214	
FRI		ECS332 BKD 3214		Office Hour	

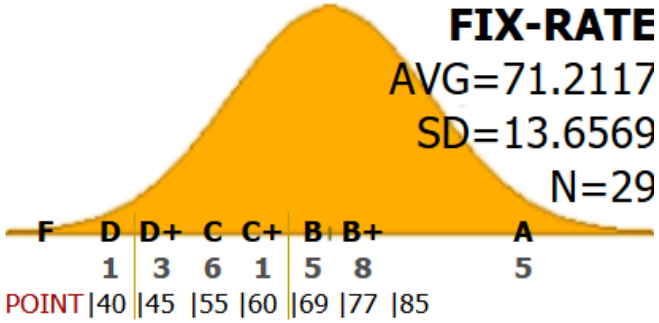
Office Hours:

BKD, 6th floor of Sirindhralai building

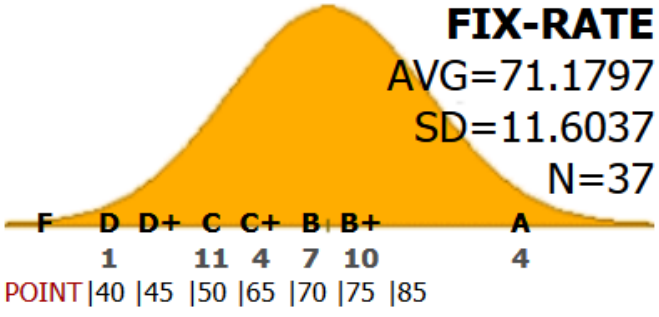
Wednesday 14:30-15:30

Friday 14:30-15:30

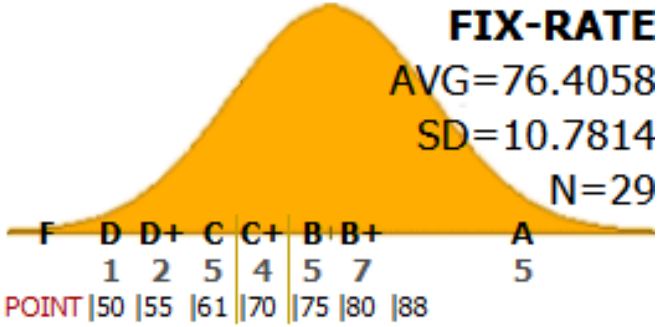
Grading System



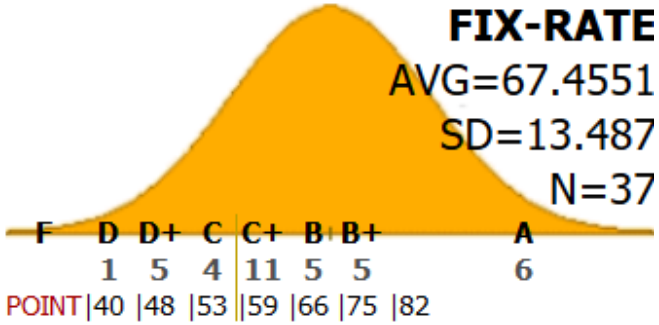
2013: CLASS GPA: 2.86



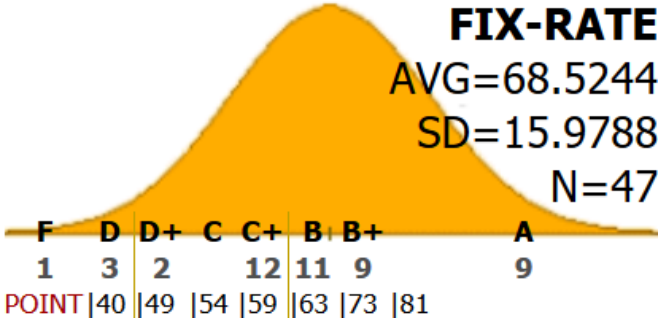
2014: CLASS GPA: 2.84



2015: CLASS GPA: 2.88



2016: CLASS GPA: 2.72



2017: CLASS GPA: 2.90

In-Class Exercises

- Most in-class exercises will occur **without** prior warning or announcement.
  - Focus on the current topic under discussion.
- Done **in group** to **reduce pressure** and provide **opportunity**
  - for those who think they understand the course material to **explain** to their friends and see whether they really know the material under consideration

  and
  - for those who are falling behind to get an **alternative explanation** from their peers
- Note that you **can't be in exactly the same group every time**.
  - Have to change your group members every time.
  - If you are with a friend before, then next time, form a group with someone else.

Class Discussion

- NOT the same as class attendance!
- If you come only to **receive**, you will fall **asleep**.
  - Do not simply sit quietly in the class.
- Need **interaction** between lecturer and students.
- **Ask question** when there is something that you don't understand.
  - Don't be shy!
  - It is very likely that your friends don't understand it as well.
- If you already understand what I'm presenting, SHOW ME!
  - Point out the errors/typos.
  - I will raise many issues/questions in class. Try to comment on them.

Policy

Based on the clock on my computer. (This should be approx. the same as your phone's and computer's clocks if they are synchronized properly.)

- We will start the class on time and will finish on time.
  - I recommend arriving at least 3 minutes before the start time.
  - Raise your hand and tell me immediately if I go over the time limit.
    - Does NOT mean that I will leave the room immediately after lecture.
    - I will stay and answer questions.
- Mobile phones *must* be turned off or set in silent mode.

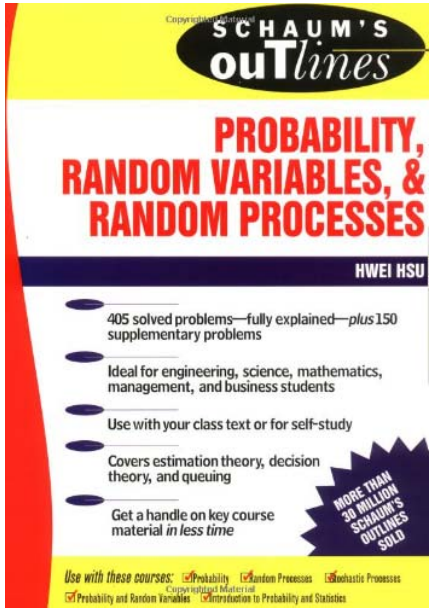
- Attendance will be taken/given irregularly and randomly.
- Cheating will not be tolerated.
- Feel free to stop me when I talk too fast or too slow.

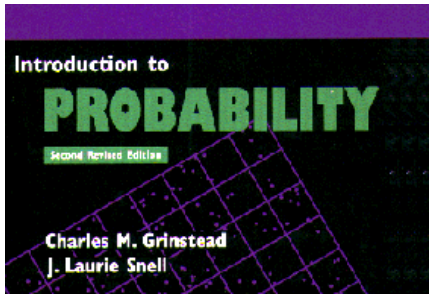
Policy (con't)

- I will surely make some **mistakes** in lectures / HW / exams.
  - Some amount of class participation scores will be reserved to reward the **first** student who informs me about each of these mistakes.
    - Grammatical errors are best informed/corrected after class.
- Points on HW / exercises / exams are generally based on your entire solution, not your final answer.
  - You may get full credit even when you have the wrong final answer.
  - You may get **zero** even when you write down a right answer without justification.

Need More Examples or Practice?

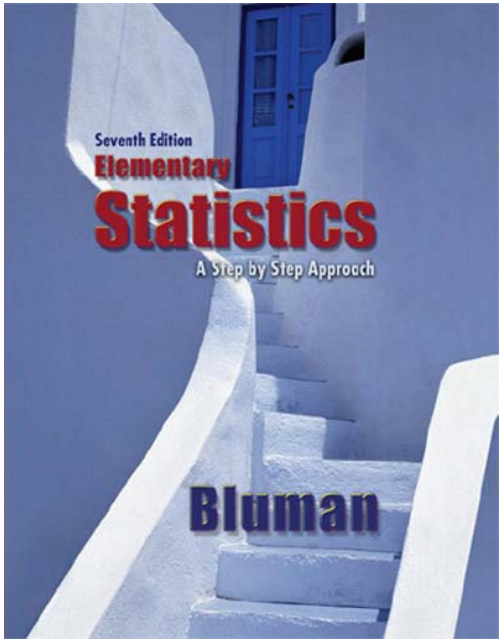
- Textbook in the library: Schaum's outline of theory and problems of probability, random variables, and random processes / Hwei P. Hsu. Call No. QA273.25 H78 1997
- Free pdf textbook: Introduction to Probability by Grinstead and Snell http://www.dartmouth.edu/~chance/teaching_aids/books_articles/probability_book/book.html

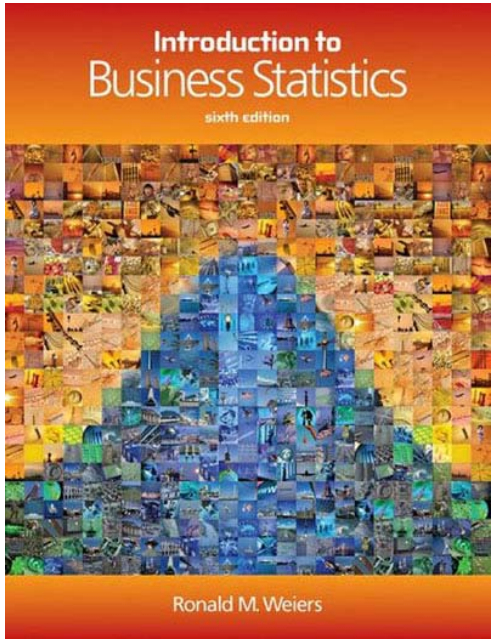


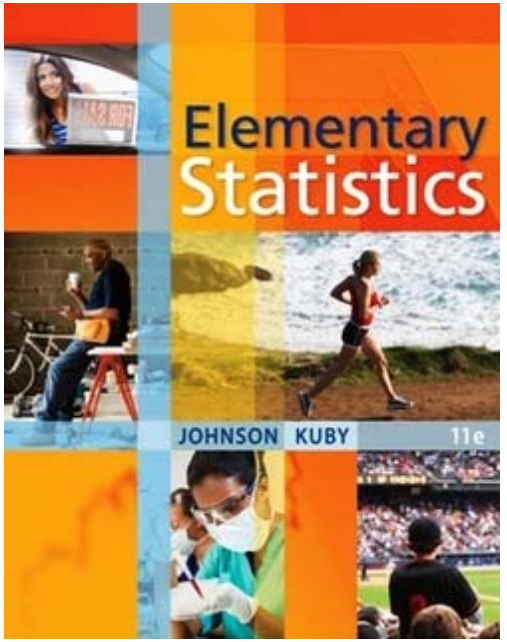


Easier References

For those who feels that this course is difficult, here are some easier references.







More beautiful pictures. Less technical.
Less applicable for content after the midterm.